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"Excellent manuals of many branches of geology are now published, which are invaluable to the advanced student and demonstrator; but from which the school-boy recoils, who would not refuse to accept objects and pictures as memory's pegs, on which to hang ideas, facts, and hard names. To school-boys, skeletons have often a strange fascination, and upon the structure of these and the classification of the vertebrata much depends. What boy that had ever been shown their skulls would call a seal or porpoise a fish, or believe a hedgehog could milk cows, as I am told many boys in Norfolk and Suffolk, as elsewhere, do believe implicitly? A series of illustrated specimens, occupying some 5,800 feet of wall-space, would give at a glance a connected and intelligible elementary view of the classification and structure of the whole animal kingdom; it would stand in the same relation to a complete museum and *Systema Naturæ* as a chart on which the principal cities and coast-lines are clearly laid down, does to a map crowded with undistinguishable details."

Dr. Hooker then touches upon his favorite study, botany, closing with a defence of Darwinism:

"In my own special science the greatest advances that have been made during the last ten years have been in the departments of Fossil Botany and Vegetable Physiology. In the past history of the globe two epochs stand prominently out—the carboniferous and the miocene—for the abundant material they afford and the light they throw on the early conditions of the vegetable kingdom. Why plants should have been so much more lavishly preserved during these than during some of the intervening or earlier epochs we do not rightly know; but the comparative poverty of the Floras of the latter is among the strongest evidences of the imperfection of the geological record. Our knowledge of coal plants, which since the days of Sternberg, Brongniart, and Lindley and Hutton, has been chiefly advanced by Göppart and Unger on the Continent, and by Dawson in Canada, has received very important accessions of late through the untiring energy of Mr. Binney, of Manchester, who has devoted nearly thirty years to the search for those rarely found specimens which exhibit the internal structure of the plant."

"Passing to the tertiary times, the labors of Count Saperte in France, of Gauden and Strozzi and of Massoloughi in Italy, of Lesquereux in America, and, above all, of Heer in Switzerland, have, within the last ten years accumulated vast numbers of species of fossil plants; and if the determination of the affinities of the majority are trustworthy, they prove the persistence throughout the tertiary strata of many interesting families and genera, and the rarity of others than these. Here, however, much value cannot be attached to negative evidence. Almost the only available materials for determining the affinities of the vast majority of these tertiary plants are their mutilated leaves, and, unlike the bones of vertebrate animals and the shells of mollusks, the leaves of individual plants are extremely variable in all their characters.

"Furthermore, the leaves of plants of different natural families and of different countries mimic one another to such a degree that, in the case of recent flowers, every botanist regards these organs as a most treacherous guide to affinity. Of the structural characters which are drawn from the internal organs of plants, and especially from their fruit, seeds, and flowers, few traces are to be found in the fossils, and yet it is from them exclusively that the position of a recent plant in the vegetable kingdom can be certified."

"Heer's labors on the miocene and pliocene Floras, especially, are of the highest value and interest. His conclusions regarding the flower of the Bovey Tracy coal-beds (for the publication of which in a form worthy of their value and of their author's merit we are indebted to the wise liberality of Miss Burdett Coutts) are founded on a sufficient number of absolute determinations; and his more recent *Flora Fossilis Arctica* threatens to create a revolution in tertiary geology. In this latter work Professor Heer shows, in apparently unassailable evidence, that forests of Austrian, American, and Asiatic trees flourished during miocene times in Iceland, Greenland, Spitzbergen, and the Polar American Islands, in latitudes where such trees could not now exist under any conceivable conditions or positions of land or sea or ice, and leaving little doubt but that an arboreous vegetation once extended to the Pole itself. Discoveries such as these appear at first actually to retard the progress of science by confounding all previous geological reasoning as to the climate and condition of the globe during the tertiary epoch."

THE GEOLOGY OF NEW YORK.*—Besides papers on Climatology and Meteorology, there is an important investigation upon the internal appen-

* Twentieth Annual Report of the Regents of the University of New York. 8vo, pp. 410. Albany, 1867. With twenty-five plates.

dages of the genus *Atrypa*, by R. P. Whitfield. Professor Hall's contributions to Palæontology include a compendious extract from his work on the Graptolites (Decade ii, of the Canadian Geological Survey), extracts from Vol. 4 of the Palæontology of New York, and observations on the Niagara limestone of Wisconsin and Illinois. The extracts are principally notices of the generic characteristics of the Devonian genera, filled with facts of the greatest value to the student of this group, and the observations trace the relation of the Niagara group, of New York, to the Guelph limestone of Canada, and the limestones of Racine and Le Claire in Wisconsin, which are said to be identical with a thin bed of limestone in Wayne county, New York, formerly referred to the Onondaga Salt Group. The lithographer has not, apparently, done full justice to Mr. Whitfield's masterly drawings, but all the plates are good, and some deserve high praise.

NATURAL HISTORY MISCELLANY.

BOTANY.

VARIATION IN WILD PLANTS.—Cultivation gets more credit for producing variation in species than I think it is fairly entitled to. The production of double flowers is especially referred to the gardener's art. I think this is rarely the case. Double Buttercups (*Ranunculus acris*, *R. bulbosa*, and *R. ficaria* all have double forms) could scarcely result from cultivation, as they are too common to be ever a cultivated plant. Yet we rarely see any tendency in this direction in wild plants. The only one I ever found double was a *Saxifraga Virginiensis*, in a shady wood on the Wissaniccon, some fifteen years ago. It was transplanted to my garden, but destroyed the same season by a careless laborer. Has any other double flower been found?—T. MEEHAN.

Saxifraga Virginiensis was found full-double at Danvers, Mass., three years ago, and it continues so from year to year. It is well worthy of the florist's attention. Incipient doubling is not uncommon in a considerable number of wild flowers; but the process of doubling is doubtless accelerated under the conditions which attend cultivation.—A. GRAY.

ZOOLOGY.

THE McNIEL EXPEDITION TO CENTRAL AMERICA.—In May last, Mr. J. A. McNiel, an enthusiastic and ardent naturalist and indefatigable collector, started on his expedition, under the immediate auspices and direction of the Peabody Academy of Science. Arriving at Panama he was cordially received, and aided by the officers of the Panama Railroad and